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CASE REPORT

Step by step of a cholecystectomy with open biliary exploration plus duodenotomy for resolution of a gallstone impacted in the ampulla of Vater after failed endoscopic retrograde pancreatography cholangio (ERCP)

Paso a paso de una colecistectomía con exploración biliar abierta más duodenotomía para resolución de cálculo biliar impactado en la ampolla de Vater tras colangio pancreatografia retrograda endoscopica (CPRE) fallida

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ABSTRACT

Introduction: gallstones are common, affecting 6,1 % of the world's population. Primary biliary choledocholithiasis is associated with biliary stasis, being more common in older patients and those with recurrent infections. Secondary choledocholithiasis, more common in the West, occurs when gallstones move into the bile duct.
Method: presents the case of a female patient who was admitted to a second level hospital in Esmeraldas, Ecuador, with symptoms of cholestatic syndrome, including abdominal pain in the right upper quadrant and generalized jaundice. An exhaustive review of his clinical record was carried out to analyze in detail his evolution and medical management.
Discussion: patients with gallstones may present serious complications such as pancreatitis and cholangitis. Advanced imaging techniques have optimized diagnosis and treatment, with typical symptoms such as pain in the right upper quadrant and alterations in liver tests. Management varies according to the level of risk, using ERCP and intraoperative cholangiography; In complex cases, open exploration may be necessary. Close postoperative follow-up is crucial to identify complications, such as bile leaks and persistent stones.
Conclusions: choledocholithiasis, which affects 10-15 % of patients with gallstones, can cause pancreatitis and cholangitis, highlighting the importance of timely diagnosis and treatment. Advances in imaging techniques have made it easier to identify and remove stones. Postoperative follow-up is crucial to detect complications such as bile leaks.

Keywords: Cholelithiasis; Choledocholithiasis; Biliary Exploration; Cholangitis; Cholecystectomy.

RESUMEN

Introducción: los cálculos biliares son comunes, afectando al 6,1 % de la población mundial. La coledocolitiasis biliar primaria se asocia con estasis biliar, siendo más frecuente en pacientes mayores y aquellos con infecciones recurrentes. La coledocolitiasis secundaria, más común en Occidente, ocurre cuando los cálculos de la vesícula se trasladan al conducto biliar.
Método: presenta el caso de una paciente femenina que ingresó a un hospital de segundo nivel en Esmeraldas, Ecuador, con síntomas de síndrome colestásico, incluyendo dolor abdominal en el cuadrante superior derecho e ictericia generalizada. Se realizó una revisión exhaustiva de su expediente clínico para analizar en detalle su evolución y manejo médico.
Discusión: los pacientes con litiasis biliar, pueden presentar complicaciones graves como pancreatitis y colangitis. Las técnicas avanzadas de imagen han optimizado el diagnóstico y tratamiento, con síntomas típicos como dolor en el cuadrante superior derecho y alteraciones en pruebas hepáticas. El manejo varía según el nivel de riesgo, empleando ERCP y colangiografía intraoperatoria; en casos complejos, puede ser necesaria la exploración abierta. Un seguimiento postoperatorio riguroso es crucial para identificar complicaciones, como fugas biliares y cálculos persistentes.
Conclusiones: la coledocolitiasis, que afecta al 10-15% de pacientes con litiasis biliar, puede causar pancreatitis y colangitis, destacando la importancia de un diagnóstico y tratamiento oportunos. Los avances en técnicas de imagen han facilitado la identificación y extracción de cálculos. El seguimiento postoperatorio es crucial para detectar complicaciones como fugas biliares.

Palabras clave: Colelitiasis; Coledocolitiasis; Exploración Biliar; Colangitis; Colecistectomia.

INTRODUCTION

Gallstones are common, especially in Western populations. Worldwide, the prevalence is 6,1 %; around 5,4 % of men and 7,6 % of women have gallstones. Patients with this condition may be asymptomatic or experience biliary colic or associated complications.[1]

Terminology

Cholecystolithiasis refers to the presence of gallstones in the gallbladder, which is not considered a disease unless it causes symptoms.

- Gallstone disease refers to gallstones that cause symptoms.
- Uncomplicated biliary disease refers to biliary colic without complications related to bile.
- Complicated biliary disease: indicates the presence of complications due to cholelithiasis, such as acute cholecystitis, choledocholithiasis, biliary pancreatitis, biliary ileus, and Mirizzi syndrome.[2]

Primary biliary choledocholithiasis, i.e., the formation of stones within the common bile duct, typically occurs in contexts of biliary stasis, such as in patients with cystic fibrosis, which increases the tendency to form intraductal stones. Older adults with dilated bile ducts and periampullary diverticula are also at increased risk of primary gallstone formation.[3]

Patients with recurrent or persistent infections in the biliary system tend to form stones in the bile ducts, something more frequently observed in East Asian populations. Other causes include ischemia due to injury to the hepatic artery, which can occur after a liver transplant. The causes of primary biliary lithiasis tend to diffusely affect the biliary tract, thus presenting both extrahepatic and intrahepatic calculi, which can be complicated by recurrent pyogenic cholangitis.[4]

Secondary choledocholithiasis results from gallstones passing from the gallbladder to the common bile duct. In Western countries, most cases of choledocholithiasis are secondary to gallstones.[5]

METHOD

We present the case of a female patient who was admitted to a secondary-level hospital in Esmeraldas, Ecuador, with symptoms of cholestatic syndrome, including abdominal pain in the right upper quadrant and generalized jaundice. An exhaustive medical record review was conducted to analyze her evolution and medical management. This report aims to offer a complete and accurate description of the case, highlighting the importance of the diagnosis and treatment of cholestatic syndrome in this context, as well as discussing the clinical findings, the diagnostic tests carried out, and the therapeutic management, as well as its clinical implications and recommendations for future similar cases.

CASE REPORT

The patient was a 45-year-old woman who was admitted with a personal medical history of cholelithiasis diagnosed 4 years ago, for which she received medical treatment. She presented with a clinical picture of +/- 4 months' evolution characterized by pain in the right hypochondrium of moderate intensity accompanied by episodes of nausea progressing to vomiting, plus unquantified temperature rises on several occasions, accompanied by jaundice, acholia, and choluria present for a month.

General physical examination

Blood pressure: 110/70 mmHg.
Heart rate: 86 beats per minute, rhythmic and without significant alterations.
Respiratory rate: 18 breaths per minute, without signs of respiratory distress.
Oxygen saturation: 98 % in ambient air.
Temperature: 36,8°C.

Regional physical examination

Oriented in time, space, and person, with a Glasgow score of 15/15, icteric sclera.

Dry oral mucosa.

Chest: symmetrical, with regular respiratory movements. Cardiopulmonary auscultation without pathological sounds; rhythmic and homophonic heart sounds, with a vesicular murmur in both lung fields, without aggregates.

Abdomen: no visible surgical scars, soft, depressible, painful on deep palpation in the right hypochondrium, Murphy's sign favorable. Hydroaerial sounds were increased. No signs of irritation were found.

Given the patient's clinical context, the following paraclinical tests, which are reported in (table 1), were requested.

Table 1. Laboratory test results

Test	Results	Test	Results
Leukocytes:	6,44 x 10^3/UL	Urea	9 mg/dl
Neutrophils	58,4 %	Creatinina	0,2 mg/dl
Lymphocytes:	27,3 %	TGO	820 U/L
Hb	13,1 g/dl	BT	12 mg/dl
Hct	40,4 %	BD	8,99 mg/dl
Platelets	185 x 10^3/UL	BI	3,32 mg/dl

Ultrasound: distended gallbladder, thickened walls with a volume of 56cc. There are two stones projected in the 2 cm cystic duct. Dilation of intra- and extrahepatic bile ducts. Proximal dilatation of the hepatocolecduum of 13 mm without visualizing a clear obstructive cause (figure 1).

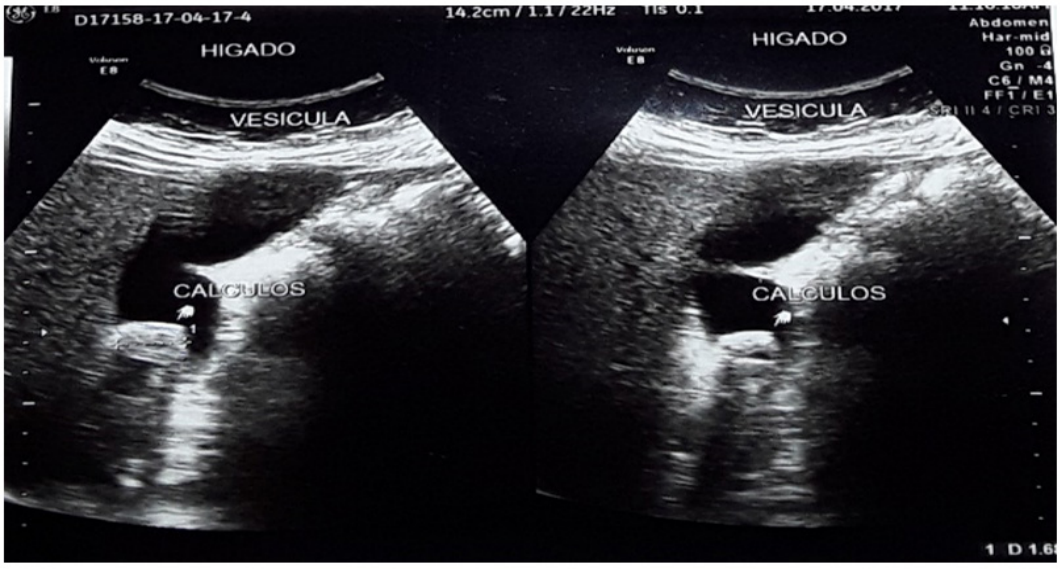

Figure 1. Ultrasound of the liver and bile ducts showed cholelithiasis and diffuse thickening of the gallbladder walls

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Based on the findings, it was suggested that it was a case of acute abdomen due to acute lithiasis cholecystitis plus a high risk of choledocholithiasis, so gastroenterology requested an ERCP, which was unsuccessful due to a stone impacted in the ampulla of Vater.

Our surgery department, therefore, prepared the operating theatre as surgery was required, proceeding under general anesthesia to perform supra umbilical median diastasis, deepening by planes until reaching the abdominal cavity, identifying the following findings:

- Adhesions of omentum to liver and gallbladder.
- Hydropic gallbladder is approximately 15 cm long by 5 cm in diameter, with stones inside (figure 2).
- Cystic duct is 2 cm long by 0,5 cm in diameter.
- Extrahepatic bile duct dilated to approximately 2,5 cm (figure 3a).
- Evidence of calculus impaction in the ampulla of Vater with severe edema of the papilla.

With these findings, an open cholecystectomy was performed, together with an exploration of the bile duct using a choledochotomy, before the placement of anchor stitches with 3,0 vicryl [figure 3b]. Duodenotomy of the second portion of the duodenum and primary suture, plus placement of a drain at the right subphrenic level externalized through the right flank and another drain at the subhepatic level externalized through the left subcostal region.

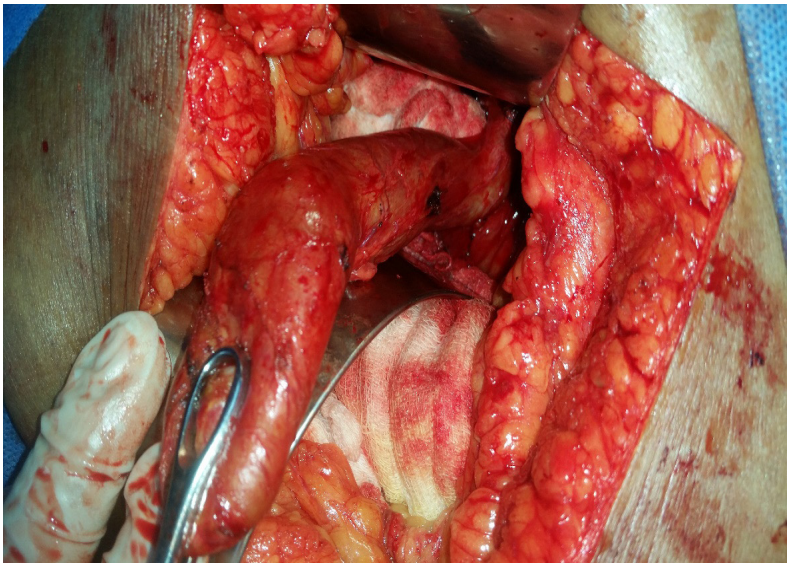

Figure 2. Hydropic gallbladder approximately 15 cm long by 5 cm in diameter

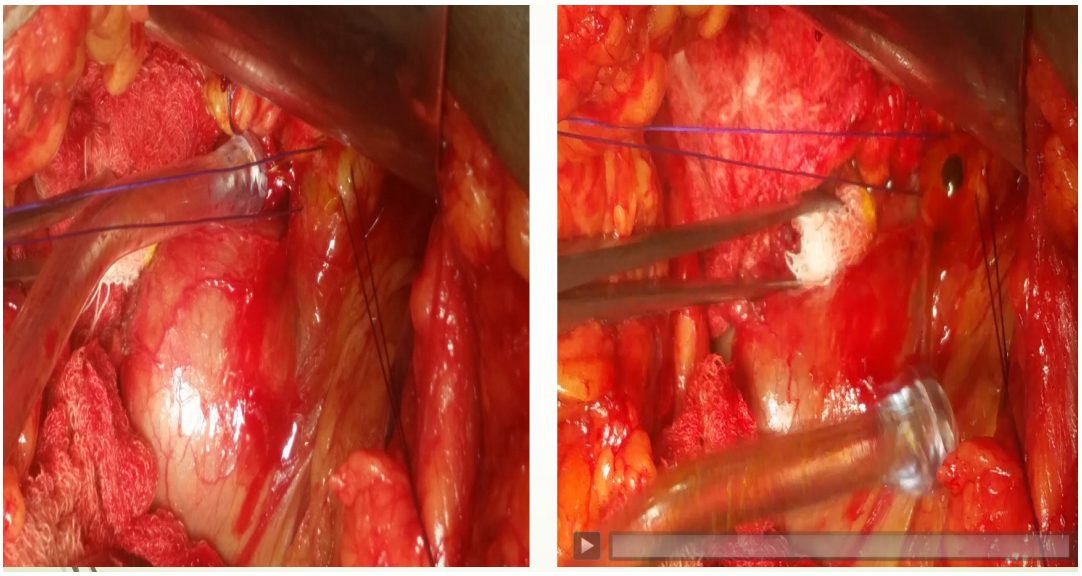

Figure 3. a. Dilated extrahepatic bile duct of approximately 2,5 cm, b. choledochotomy in the extrahepatic bile duct after placement of anchor points

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Due to the evidence of a gallstone impacted in the ampulla of Vater, extraction has been attempted on several occasions by manual exploration and with the aid of Randall forceps without success (figures four a and b).

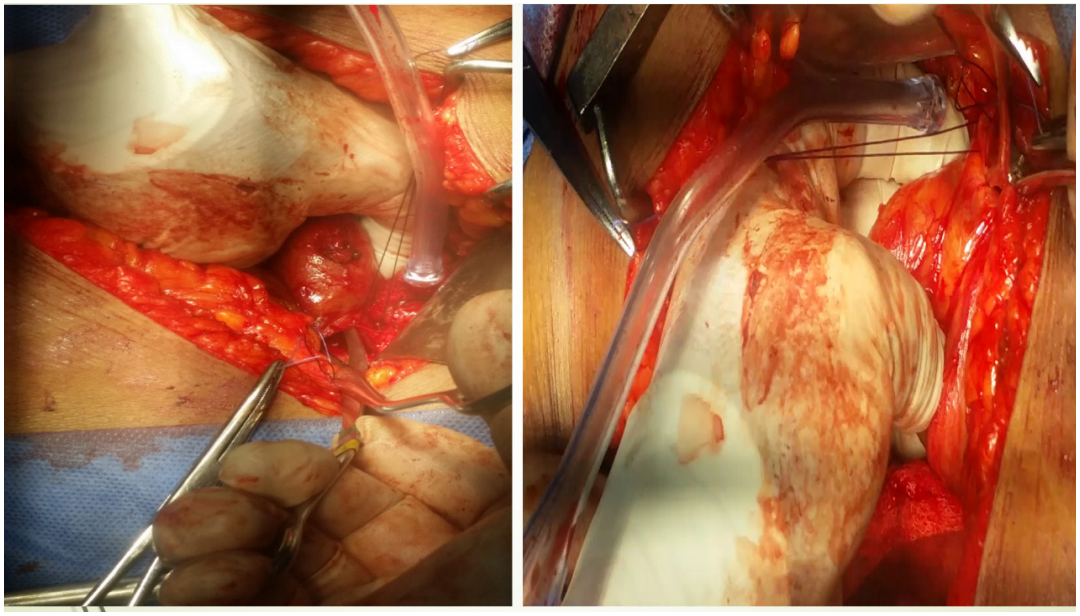

Figure 4. a. Calculus impacted at the level of the second duodenal portion in the ampulla of Vater identified by manual palpation, b. Exploration of the bile duct using Randall forceps

As the stone could not be removed through the bile duct, an attempt was made to remove it by performing a duodenotomy of approximately 3 cm and then a papillotomy, achieving the extraction of the gallstone (figure 5).

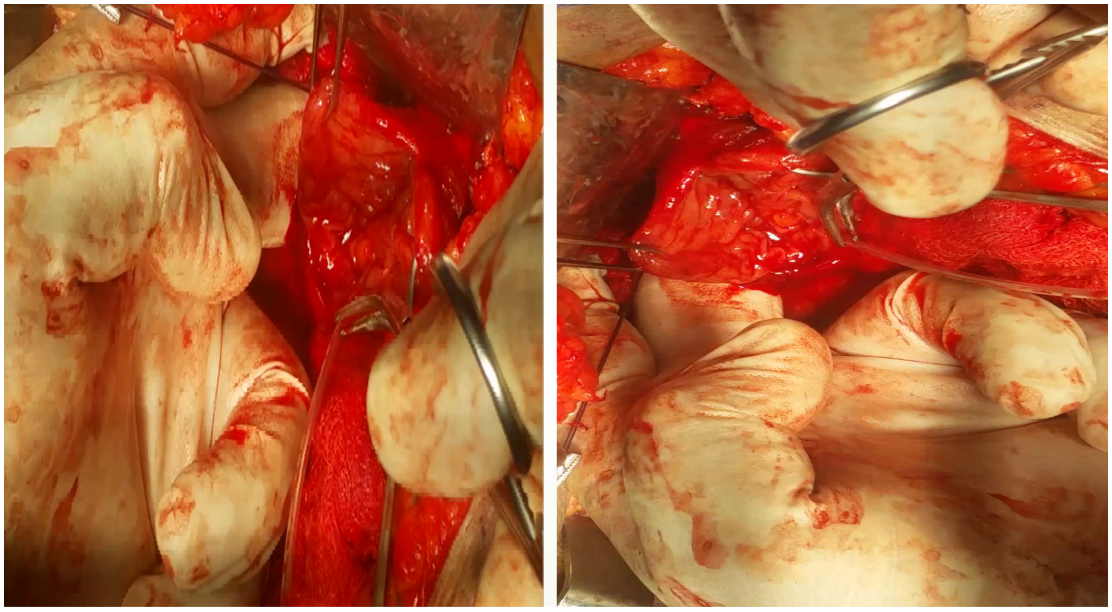

Figure 5. Duodenotomy of approximately 3 cm plus papillotomy

Finally, a duodenorrhaphy is performed, verifying its impermeability, and a Kehr's T-tube is placed in the bile duct (figure 6), exteriorizing it through the right subcostal region in the abdominal wall (figure 7).

The patient's postoperative course was uneventful. She was treated with ceftriaxone and metronidazole antibiotic therapy, and on the second day after surgery, she was started on oral tolerance, which she progressed to gradually. He remained hospitalized for 7 days after abdominal surgery, with an adequate evolution, tolerating the diet adequately, so he was discharged for subsequent outpatient check-ups.

In the outpatient clinic, the patient was evaluated and found to be progressing favorably. With a surgical wound without signs of infection and drains with little production, they were removed, and the wound was left alone with Kehr's T-tube in place.

Figure 6. Placement of a Kehr T-tube in the bile duct

Figure 7. Arrangement of the drains and Kehr's T-tube at the level of the abdominal wall

DISCUSSION

Common bile duct (CBD) stones are detected in 10-15 % of patients undergoing surgery for symptomatic gallstones. These stones require removal to relieve symptoms and prevent complications such as acute cholangitis, liver abscess, and acute pancreatitis.[5]

In the past, CBD stones were diagnosed by intraoperative cholangiography and treated with open exploration of the duct. However, advances in preoperative imaging technologies, such as magnetic resonance cholangiopancreatography (MRCP) and endoscopic ultrasonography, together with the development of endoscopic retrograde cholangiopancreatography (ERCP) and minimally invasive surgical techniques, have facilitated more precise and less invasive methods for the identification and treatment of stones in the BCC.[6]

Patients with choledocholithiasis usually experience pain in the right upper quadrant and present laboratory results that indicate a cholestatic pattern in liver tests (such as elevated bilirubin and alkaline phosphatase). Uncomplicated cases of choledocholithiasis are usually afebrile, with normal blood count and pancreatic enzymes. Some patients may be asymptomatic, and in these cases, the diagnosis is suspected by abnormal liver

tests or abnormalities in imaging studies obtained for unrelated reasons or if intraoperative cholangiography during cholecystectomy suggests the presence of a stone in the CBD.[7]

Uncomplicated choledocholithiasis

Symptoms: Most patients with choledocholithiasis have symptoms, although some may be asymptomatic. Symptoms include pain in the right upper quadrant or epigastrium, nausea, and vomiting. The pain lasts longer than in typical biliary colic (which usually resolves in six hours). The pain of choledocholithiasis is relieved when the stone is spontaneously expelled or removed. Some patients may present intermittent pain due to a transient blockage in the CBD caused by the retention or flotation of stones or residues, known as the "valve effect." [8]

Physical examination usually reveals pain in the right upper quadrant or epigastrium. Jaundice may also be present. The Courvoisier sign (palpable gallbladder) appears when there is dilation of the gallbladder due to obstruction of the common bile duct, often related to malignant obstruction. However, it can also occur in choledocholithiasis.[8]

Serum concentrations of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) tend to rise at the onset of biliary obstruction, sometimes significantly. Subsequently, liver function test values show a cholestatic pattern, increasing serum bilirubin, alkaline phosphatase, and gamma-glutamyl transpeptidase (GGT) more significantly than those of ALT and AST. Improvement in liver function tests and resolution of symptoms suggests that the stone has been spontaneously expelled, although this does not rule out the possibility of additional stones.[8]

Complicated choledocholithiasis

The two main complications of choledocholithiasis are pancreatitis and acute cholangitis.

Acute pancreatitis: in addition to the symptoms of uncomplicated gallstones, patients with biliary pancreatitis present with vomiting, abdominal pain, and elevated serum amylase and lipase (more than three times the standard limit) or imaging findings suggestive of acute pancreatitis.[8]

Acute cholangitis: patients with acute cholangitis usually present with Charcot's triad (fever, right upper quadrant pain, and jaundice) and leukocytosis. In severe cases, hypotension and altered mental state (Reynolds pentad) may develop. Cholangitis causes around 2400 deaths per year in the USA.[9]

Prolonged biliary obstruction, such as that caused by stones in the common bile duct, can lead to progressive liver disease that culminates in secondary biliary cirrhosis. Although rare in choledocholithiasis, secondary biliary cirrhosis can generate the same complications as cirrhosis from other causes.[10]

The diagnosis of choledocholithiasis combines laboratory tests and imaging studies. Generally, the first imaging test is a transabdominal ultrasound, complemented as necessary with magnetic resonance cholangiopancreatography (MRCP) or endoscopic ultrasound (EUS). Endoscopic retrograde cholangiopancreatography (ERCP) is reserved for therapeutic intervention in patients with high suspicion of common bile duct (CBD) stones or when other studies confirm choledocholithiasis. ERCP has significant risks, such as pancreatitis, bleeding, and perforation.[10]

In patients with suspected choledocholithiasis, the procedure begins with a transabdominal ultrasound, and a complete blood count is also obtained to detect leukocytosis (indicative of acute cholangitis), liver tests, and pancreatic enzymes to evaluate for pancreatitis.[10]

Abdominal ultrasound is the first imaging test used when there is suspicion of stones in the CBD, allowing for the evaluation of cholelithiasis, choledocholithiasis, and dilation of the common bile duct. It is an accessible, non-invasive, low-cost test that can be performed at the patient's bedside. The sensitivity for detecting stones in the CBD varies from 20 to 90 %, with a specificity of 91 % in some studies.[10]

An ultrasound shows dilation of the CBD, although this is not specific. The common cut-off point for classifying a duct as dilated is 6 mm, although this criterion varies with age and surgical history, such as cholecystectomy. However, strict use of the 6 mm cut-off may miss stones in the CBD; one study showed that patients with "nondilated" CBD (according to the 6 mm cut-off) still had stones 0 to 4 mm: 3,9 %, 4,1 to 6 mm: 9,4 %, 6,1 to 8 mm: 28 %, 8,1 to 10 mm: 32 %, >10 mm: 50 %.[11]

Risk assessment for choledocholithiasis

- High Risk: includes patients with acute cholangitis, bilirubin levels >4 mg/dl accompanied by dilation of the CBD, or direct visualization of a calculus in the CBD by ultrasound.
- Intermediate Risk: patients with abnormal liver enzymes, age over 55 years, or dilated CBD. These patients have a 10-50 % probability of choledocholithiasis.
- Low Risk: they do not present predictors of high or intermediate Risk.[11]

Management according to risk level

High Risk: In cases of cholangitis or acute pancreatitis, a preoperative ERCP is performed with stone extraction. If this is not possible, percutaneous or endoscopic biliary drainage is chosen, depending on the

characteristics of the patient. For other high-risk patients, the management choice includes ERCP followed by elective cholecystectomy or cholecystectomy with intraoperative ERCP.[12]

Intermediate Risk: These patients require additional testing before performing an ERCP. They can opt for magnetic resonance cholangiopancreatography (MRCP) or endoscopic ultrasound (EUS), which allows for an accurate evaluation and avoids the risks of unnecessary ERCP.[12]

Alternatively, they can undergo laparoscopic cholecystectomy with intraoperative cholangiography to detect stones in the CBD.

Evaluation of suspected stones with negative CRM

If moderate-to-high suspicion persists (based on laboratory results), EUS can be performed, and if stones are detected, ERCP can be performed in the same session.

Strategies in cases of intermediate Risk: laparoscopic cholecystectomy with intraoperative cholangiography or ultrasonography.

Deciding between these options depends on the resources available and the surgical experience of the center.[13]

Intraoperative imaging and treatment techniques

- Intraoperative cholangiography: 59-100 % sensitivity and 93-100 % specificity for detecting stones, although it can be difficult in an inflamed gallbladder.
- Intraoperative ultrasonography: highly effective (sensitivity and specificity greater than 90 %) and less invasive, although it requires experience. In certain centers, it is preferred due to its precision and lower Risk of injury.[13]

Management according to intraoperative results

- Positive for CBD stones: include laparoscopic exploration of the CBD or intra- or postoperative ERCP in experienced centers.
- Negative for CBD stones: Continue with cholecystectomy without additional imaging, except in special cases of high suspicion.[14]

Special considerations

- Associated acute pancreatitis: urgent ERCP (<24 hours) in patients with gallstone pancreatitis and acute cholangitis.
- HistoryHistory of cholecystectomy: assess with MRCP or EUS if symptoms persist and liver tests are abnormal.[15]

Open CBD exploration: indications for open exploration of the CBD

- Cases where laparoscopic and endoscopic extraction failed.
- Patients without the availability of endoscopic and laparoscopic resources.[15]

Surgical procedure

- Incision and retraction of structures.
- Choledochotomy and extraction of stones with balloon, irrigation, or choledochoscopy.
- Closure of the choledochotomy.[15]

Primary closure is preferable to the use of a T-tube, avoiding prolonged hospitalization and with no significant differences in clinical outcomes.

Placement of a T-tube after open exploration of the common bile duct is still a common practice among many surgeons, especially in situations where there is a risk of stenosis or increased pressure in the duct due to inflammation or edema of the papilla or stone retention. This tube allows access to the bile duct in case of retained stones and facilitates future interventions if endoscopic access has failed.[15]

Placement procedure

Tube selection and preparation: The largest T-tube that fits comfortably in the common bile duct is chosen. To facilitate placement and subsequent removal, the ends of the tube are cut at an angle, and the back wall is opened. The tube is carefully placed, and the choledochotomy is closed around it with fine, absorbable sutures. The tube is then taken out of the abdomen through an additional incision and firmly fixed to the skin to prevent it from moving.[16]

In the postoperative period, liver function tests (LFTs) should be monitored if complications or retained stones are suspected, although they may take more than a week to normalize. Between 24 and 48 hours post-operatively, a cholangiogram is performed through the T-tube. If it is normal, the tube is washed with a sterile

saline solution daily and kept clamped for 10 to 14 days before removal. In case of obstruction or retained stones, the tube is left open for one to two weeks.[16]

Complications and Management

Biliary Leakage: This can occur through various orifices in the bile duct. The incidence is 2-16 %, and it is usually resolved by percutaneous drainage and stent placement if necessary.

Persistent Calculi: Around 0-5 % of patients may have persistent calculi. The choice of treatment will depend on the characteristics of the patient and the options available.[16]

Use of Drainage: In the case of open exploration of the common bile duct with choledochotomy, a closed suction drain (such as a Jackson-Pratt drain) is placed to prevent fluid accumulation and maintain adequate pressure in the surgical area. Cholangiography through the T-tube should show no leakage before the drain is removed.[16]

CONCLUSIONS

Choledocholithiasis, which occurs in 10 to 15 % of patients with gallstones, can lead to serious complications such as pancreatitis and acute cholangitis, making timely diagnosis and treatment essential. Advances in imaging techniques, such as magnetic resonance cholangiopancreatography and endoscopic ultrasonography, together with endoscopic retrograde cholangiopancreatography, have significantly improved the identification and extraction of stones in the common bile duct, allowing for less invasive management. Typical symptoms include right upper quadrant pain, jaundice, and abnormal liver function tests, while asymptomatic presentation is often discovered incidentally. Preoperative ERCP is recommended in high-risk cases, while additional tests should be performed in intermediate-risk instances to avoid unnecessary procedures—intraoperative techniques, such as cholangiography and ultrasonography, guide surgical management. Despite improvements in treatment, postoperative follow-up is vital to detect complications such as bile leaks and persistent stones, requiring a careful multidisciplinary approach to ensure patient recovery.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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